Alcohol Involvement Over the Life Course

Alcohol is the world's most commonly used drug. In all drinking societies, patterns of alcohol use and abuse are superimposed on the structure of a person's life activities. For this reason, indicators of variation between people's lives, such as age and gender differences, socioeconomic status, and ethnocultural group membership, have all been useful as markers in understanding variation in alcohol use and abuse.

Social scientists interested in describing this variation use explanatory models that have focused on the differences between subgroups in norms about alcohol use and abuse and on differences in the availability of alcohol (Edwards 1994; Greenfield and Room 1997). Underlying reasons for variation in alcohol use include social controls and availability. If the larger social group frowns on use, then people are less likely to drink, or to drink heavily. Similarly, when alcohol is not readily available, fewer cues prompt people to drink (out of sight, out of mind). Also, if alcohol is harder to obtain, consumption rates tend to be lower.

These explanations are sometimes referred to as "top-down" factors because they focus on the effects of societal and group-level influences on an individual's behavior. However, the impact of social and cultural influences on drinking behavior is not the same for all members of a culture. Families and peer groups create smaller spheres of influence within the larger culture. In addition, differences in each person's neurobiology create unique personal vulnerabilities and protections. Thus, each individual can be seen as a host environment upon which social and cultural factors act. Influences at the level of the individual person are sometimes referred to as "bottom-up" factors. From the bottom up, a person's drinking behavior can be seen to begin with molecular genetics, and behavior follows a causal path from molecules, to cells, to brain systems and structures, to behavior (Anderson 1998).

At the same time, not all drinking behavior is explainable by either top-down or bottom-up factors. Some of the variation results from interaction of these factors and occurs at the level of the drinking behavior itself. Learning is one such interactive influence, since drinking is a learned behavior. Children begin to learn about alcohol and its effects long before they have had their first drinking experience. They continue to learn about it as a function of where and how they obtain their first drink, who introduces it, how much the environment allows or even encourages a progression of drinking, and their own subjective experience of the drug's pharmacologic effects. Thus, alcohol involvement occurs over time and progresses—or not—according to an intricate process that involves the larger sociocultural system; the individual's age, life stage, and social role within that system; the demands and opportunities of the individual's more immediate social environment; and the unique pattern of neurobiological vulnerability and protection that his or her genetic endowment provides.

These ideas are central to developmental theory, a conceptual framework that has enhanced understanding of the factors regulating gene expression in animals (Gottlieb 1991) and in humans (Sing et al. 1992, 1996), the changes in risk factors for physical and mental disorders from early childhood to adulthood (Wierson and Forehand 1994; Windle and Tubman 1998), and the top-down social forces that dampen or increase the expression of individual psychopathology from one historical era to another (Elder and Caspi 1989). Within the field of alcohol research, the body of work based on this view has become known as the developmental perspective on alcohol use, abuse, and dependence. This perspective has fostered a line of research that has gained momentum in the last two decades because of compelling evidence (1) that individuals and groups demonstrate great variability in their drinking patterns, (2) that

variability in drinking patterns is not constant across the life span, and (3) that pressures to drink—or not to drink—are concentrated at certain stages in the course of a person's life.

Like all researchers on alcoholism, developmental scientists seek to understand the causes of alcoholism. They examine the interplay of multiple factors—sociocultural, psychological, and neurobiological—that influence drinking behavior and that create a variety of pathways leading to or away from different subtypes of alcoholism. The developmental perspective, with its emphasis on maturational processes, life course variation, and the interplay of environment and individual vulnerability, is of central importance to the field because findings from this research have demonstrated that, for the majority of individuals, risk is fluid over the course of life. As each person moves through his or her life, a variety of risk and protective factors come into and move out of play. Not all are present at the same time, and their sequencing is regulated not just by the individual's unique vulnerability, but also by the person's history of exposure to alcohol and the immediate presence (or absence) of an environment that enhances risk in some instances and dampens it in others.

The developmental perspective has enriched our understanding of the timing and mechanisms involved in these "in and out of play" sequences (for example, Caspi and Bem 1990; Schulenberg et al. in press). It has also stimulated researchers to include indicators of the larger social context—the top-down factors—in their explorations of individual vulnerabilities in more recent models of risk development. The work has demonstrated that developmental clocks set in different eras lead to different long-term experiences (Elder 1997). For example, when investigating drinking behavior, it is important to understand that a person who came of age during World War II has very different norms and expectations about substance use than a person who came of age in the Vietnam War era. Similarly, a woman from a Hispanic-American culture has a different pattern of alcohol use than a man in her culture and than women in other cultures. Further, to understand her risk factors, it is important to know whether she is a first-, second-, or third-generation American and whether she is a grandmother, a young mother, or a teenager.

One way that developmental researchers convey the variability in drinking behavior that occurs over the span of a person's lifetime is by using the term "drinking trajectory," a concept that embraces the ideas of time, course, and progression. A trajectory is different in subtle but important ways from a "drinking pattern," which suggests unchangingness and persistence over time. When viewed over the short term, some trajectories describe patterns of problem drinking that appear stable. However, some trajectories shift when researchers extend the span of time observed. Other trajectories describe a steady progression that reflects a gradual accumulation of risk factors.

From the developmental perspective, it is also important to understand that the accumulation of risk factors, no matter how heavy, does not lead inevitably from heavy risk burden to alcoholism. Intervening factors, both internal and environmental, play a role in sustaining some trajectories and shifting others. By examining variability in alcohol use and abuse across the life span and by simultaneously tracking the interplay of other internal and environmental factors, developmental scientists seek to isolate and describe the different drinking trajectories of individuals and of important subgroups, such as ethnic and gender groups.

This section is based on life course theory, which explores processes by which multiple factors, at multiple levels, interact over time. These interactions have the potential to produce varying patterns of drinking and drinking consequences at each stage of an individual's life. Understanding the multiple and varied influences on an individual's drinking trajectory is a complex problem. However, developmental scientists have been able to "deconstruct" the process into its component parts to allow focused analysis and

refined understanding. A clearer understanding of the course of drinking behavior and its variability is important for developing prevention and treatment methods effective with specific subgroups.

This section summarizes recent research, with special focus on two phenomena: developmental variations in drinking behavior over the life course, and developmental differences in patterns of drinking behavior among subgroups. Specifically, this section first reviews the well-documented age progression in alcohol use and related problems in adolescence and discusses how age serves as a basic indicator of critical developmental experiences. Within this framework, early-childhood influences on alcohol use are considered, and findings are reviewed from studies about how a child's learning leads to his or her initial understandings about alcohol. The section then reviews the substantial evidence that very early behavioral differences are markers of a high-risk trajectory into alcohol-related problems and dependence in adolescence and young adulthood. The section then moves from a focus on variation across an individual's life span to evidence about the role that social contexts play in the development of drinking behavior. Like age, membership in certain social groups, such as gender and ethnic groups, is an indicator of important underlying social processes. Recent evidence on the interaction of demographic factors and variations in alcohol use among the elderly is also reviewed.

Understanding the Age Progression of Alcohol Involvement in Childhood and Later Life

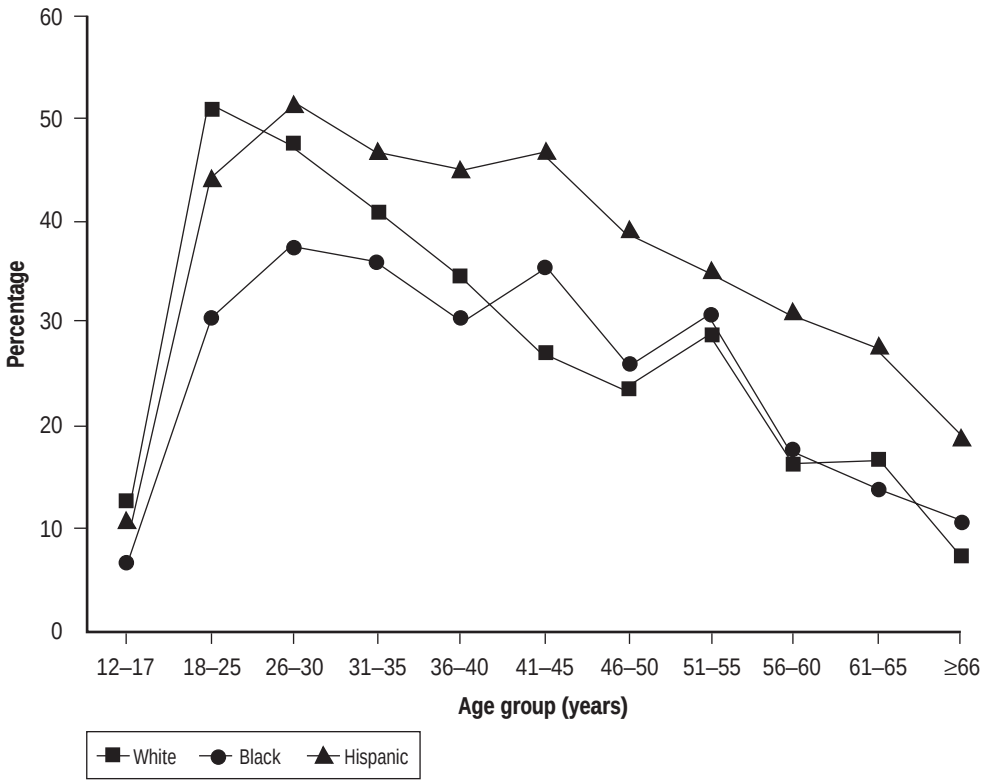
Most research on age-related variation in early drinking behavior has focused on adolescence because alcohol use and associated problems typically begin during the teenage years. In 1999, for example, 52 percent of 8th graders (that is, 14-year-olds) and 80 percent of 12th graders (18-year-olds) reported having used alcohol at least once (Johnston et al. 1999). Also, more problematic drinking patterns usually begin during the teen years, in a parallel age-related progression that involves fewer individuals. Thus, 15 percent of 8th graders and 31 percent of 12th graders reported bingeing (taking five or more drinks in a row at least once in the past 2 weeks), and 9 percent of 8th graders and 33 percent of 12th graders reported being drunk in the past 30 days (Johnston et al. 1999). The problem indicators continue to move upward until the early 20's, and then start to drop off (Jackson et al. 1998) (figures 1 and 2).

In describing these age-related changes in alcohol use, life course theory emphasizes that age progression, in and of itself, does not explain the process. Rather, age serves as a marker for a large number of experiences related to being familiar with alcohol, using it over time, seeing others use it or refuse to use it, and receiving encouragement—or discouragement—to drink. It is the accumulation of experiences that leads to the change in behavior, not increasing age itself. The technical term that researchers use is that these experiences "mediate" the age-related variation.

Developmental Patterns

From the perspective of the child's accumulating experience, neither the first drink nor the first experience of heavier drinking marks the beginning of alcohol involvement. The developmental problem for researchers is to specify the factors (the mediators) that establish a person's early drinking experience. What circumstances move the individual from lighter to heavier and more problematic drinking? An important area for investigation is the thought processes that shape a person's decisions about whether or not to drink (Fischhoff and Quadrel 1995). As individuals develop, they acquire information on which their knowledge, beliefs, and attitudes are based. Information about alcohol can be acquired directly and indirectly, through experience and observation, via thoughts and emotions, and from obvious and subtle events. Knowledge, beliefs, and attitudes about alcohol, which serve to motivate behavior, are organized into frameworks known as cognitive models or schemas (Zucker et al. 1995*b*).

Figure 1: Percentage of males reporting having four or more drinks on any single day in past 30 days, by age group and race/ethnicity, United States



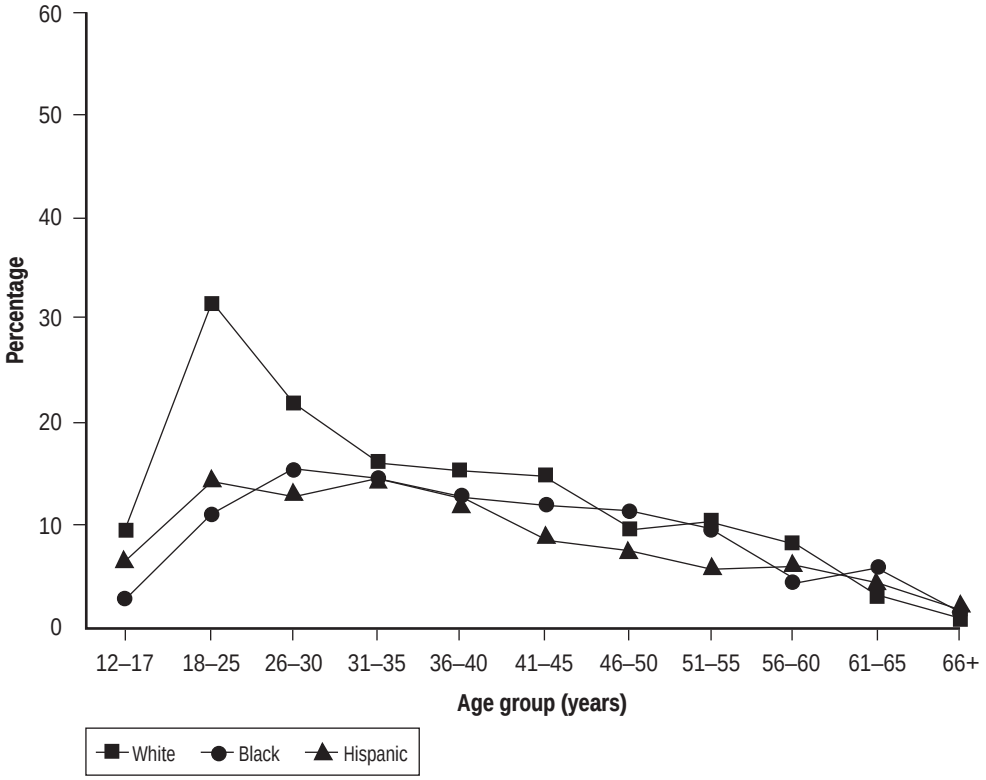
Source: Jackson et al. 1998.

For regular and intentional drinking to occur, a person must first understand that there is a class of substances known as alcoholic beverages and that certain effects are connected with drinking them. Further, the effects must be perceived by the person as desirable enough to motivate alcohol-seeking or alcohol-accepting behavior (Zucker et al. 1995*b*). These awarenesses and perceptions (or schemas) operate on both conscious and unconscious levels. Thus, people form conscious and explicit expectations about the anticipated effects of alcohol (Goldman et al. 1991; Rather et al. 1992), as well as unconscious memories, called implicit cognitions, that influence behavior (Stacy et al. 1996). Both explicit and implicit cognitions have been found to predict alcohol use (Smith et al. 1995; Stacy 1997; Stacy et al. 1996).

Early Understandings About Alcohol

Alcohol involvement has its roots in early childhood, when youngsters first learn about alcohol and its use. Because alcohol has a place in the ritual practices of many religions, some children have limited experience with alcohol consumption well before they have made a conscious decision to drink (Glassner 1991; Heath 1991). In addition, media exposure virtually assures some knowledge of alcoholic beverages long before the opportunity for drinking arises (Atkin 1995; Wyllie et al. 1989). Children also learn by more direct experience. Research has shown that young children, even at age 3 through 5, attribute alcoholic beverage consumption more to adults than to children, and more to adult males than to adult females (Noll et al. 1990). Further, the ability to identify alcoholic beverages by smell, indicating personal

Figure 2: Percentage of females reporting having four or more drinks on any single day in past 30 days, by age group and race/ethnicity, United States



Source: Jackson et al. 1998.

rather than media exposure, has also been seen in preschool children, with older children more successful than younger ones at identifying alcoholic beverages (Noll et al. 1990). This ability to recognize alcoholic beverages was directly related to the amount of alcohol consumed by the child's parents and the degree to which parents reported drinking for "escape" reasons.

On the basis of this research, one might expect that children of alcoholics would develop alcohol schemas earlier than other children, and one would want to focus on early identification of "risky cognitions" about alcohol because of their long-term significance in the development of problem drinking. When researchers explored cognitions in 3- to 6-year-olds, they found that early alcohol understandings were more common in children of alcoholics than in children of nonalcoholics (Zucker et al. 1995*b*). When photographs of alcoholic beverages were shown to children of alcoholics and children of nonalcoholics, the children of alcoholics were more likely to identify at least one alcoholic beverage, and they were better able to identify specific alcoholic beverages. Further, children whose parents drank more were more likely to attribute alcoholic beverage use to adults. Thus, children's schemas about both knowledge and use of alcohol were more common in alcoholic families. Other recent research indicates that these processes may begin even before formal language is present. Six- to 13-month-old infants whose parents reported higher alcohol consumption and who had some indicators of alcoholism responded differently to toys that were scented with alcohol than did infants from families in which parents drank less (Mennella and Beauchamp 1998). This work indicates that the child's learning and recognition of alcohol begins at a very young age.

Although research has yet to reveal how early understandings about alcohol relate to the actual onset of drinking behavior, studies on the thought processes of second through fifth graders (aged 8 through 11) showed that children's expectations about the effects of using alcohol were similar to those of adults (Dunn and Goldman 1996). Further research among 3rd through 12th graders indicated that younger children had mostly negative alcohol-related associations, describing drinkers with words such as "dizzy" and "goofy," while the older children had more positive associations, using words such as "outgoing," "relaxed," and "funny" (Dunn and Goldman 1998).

Taken as a group, these findings from early to middle childhood indicate a developmental progression in understandings about alcohol, including expectations about alcohol's effects, that takes place much earlier than regular use of alcohol begins. The progression varies with age, but in part also reflects differences in exposure to consumption in the family, with precocious development of understandings about alcohol being more common in alcoholic homes.

Early Behavioral Indicators of Risk for Alcohol Problems

Not all of the factors that play a role in early alcohol use and the development of alcohol problems are related to alcohol-specific processes, such as childhood exposure to alcohol. An important and much-repeated finding of past research has been the link between aggressive behavior, delinquent activity (that is, behavior that deviates from social norms), and earlier onset of alcohol use and problematic use (Donovan and Jessor 1985; Donovan et al. 1998; Jessor and Jessor 1977; Kandel et al. 1978; White et al. 1999). Alcohol use is only one part of a broader syndrome of adolescent problem behavior that includes other drug use, earlier sexual activity, and delinquent and aggressive conduct. Extensive research has shown that these problem behaviors cooccur and emerge from a common matrix of personality structure, attitudes, and parental socialization practices that encourage the development of independent and rebellious behavior (Kandel et al. 1978; Zucker et al. 1995*a*). Adolescents with these risk characteristics become more involved in relationships with like-minded peers, which, in turn, fuels the emergence of earlier and more problematic alcohol use.

A parallel line of research has focused on individual differences in temperament as early links in the chain of risk for the development of alcohol problems in later childhood and adolescence and for the subsequent development of alcoholism in adulthood. A person's temperament is evident in early childhood and even in infancy and is believed to be heavily under genetic control, regulated by neurobiological mechanisms. Alcohol researchers have looked at such dimensions of temperament as elevated activity level, low attention span and persistence, and high emotionality as predictors of problem alcohol use (for example, Tarter and Vanyukov 1994*a*; Tarter et al. 1985).

Developmental researchers pursuing this line of inquiry have been interested in a sequential hypothesis. Simply stated, the sequence is that the child's underlying "risky temperament," coupled with a difficult family environment that exacerbates the temperamental characteristics, leads the child to heightened antisocial behavior and to more frequent associations with delinquent peers. These attributes in turn drive early alcohol use, the transition into early problem use, and ultimately, the emergence of a diagnosable disorder (Tarter and Vanyukov 1994*b*; Zucker et al. 1995*b*). Until very recently, only the preadolescent and adolescent versions of this model had been tested, and the tests involved cross-sectional rather than longitudinal data. Even so, investigators have found support for a model of risk for alcohol use in preadolescents and adolescents that involves difficult temperament plus risk factors in the family-rearing environment and peer group (Blackson 1997; Blackson and Tarter 1994; Blackson et al. 1994).

The first long-term tests of the connections between early childhood and adulthood have been reported. In a New Zealand study, more than

1,000 children born between 1972 and 1973 were followed up by researchers over a 20-year period (Caspi et al. 1996). Among males, the researchers found a direct link between "behavioral undercontrol" at age 3 and alcohol dependence at age 21. Behavioral undercontrol was characterized as irritable, impulsive, impersistent, and rough behavior and an unstable emotional response. Boys having these traits were significantly more likely than boys without them to be diagnosed 20 years later with alcohol dependence. No differences in later alcohol dependence were found for undercontrolled girls. In the same study, another childhood temperamental factor—behavioral inhibition—was found to be linked to later development of alcohol problems at age 21 among males. Behavioral inhibition included social reticence, concentration difficulties, and being upset by strangers. Girls who were inhibited at age 3 did not display more alcohol-related problems at age 21.

These findings from New Zealand are similar to observations of 3- to 5-year-old boys from alcoholic families and matched nonalcoholic control families being followed in a longitudinal study of high-risk children in Michigan. This work, as well as three studies of older children that also yielded findings similar to the New Zealand study, is described below.

Early results from the Michigan study indicated that 3-year-old sons of alcoholics were more impulsive than comparison children, and a greater proportion of them were rated in the upper clinical range of behavior problems (Fitzgerald et al. 1993). Later work found that boys with clinically diagnosed behavior problems also displayed more difficult temperaments (Jansen et al. 1995). These troubled children were also more likely than comparison children to come from families in which the fathers were of lower socioeconomic status, had more severe and long-standing alcohol problems, and displayed higher levels of antisocial behavior. Thus, multiple factors converged to heighten these children's risk for later alcohol problems (Jansen et al. 1995; Zucker et al. 1996*a*).

More recent longitudinal findings over the interval from 3 to 8 years of age, and involving girls as well as boys, continue to support the earlier cross-sectional observations (Wong et al. 1999). They also support the sequential hypothesis described above. The typical maturational pattern of childhood involves decreases in aggression and undercontrolled behavior (also known as "externalizing" behavior) from early to middle childhood. However, for children in the study who were from the highest risk families—families that were more antisocial and alcoholic—aggressive and undercontrolled behaviors decreased at a slower rate than for children from lower risk families. In addition, the link between risky child temperament and externalizing behavior in the highest risk families was mediated by the parents' behavior. Parents who reported more negative experience (more sadness and "bad mood") and who reported spanking their children more often were more likely to have children with higher levels of undercontrolled behavior (Wong et al. 1999). In other words, the most damaging child outcomes were being sustained in families where the children had risky temperament characteristics *and the families acted in ways to exacerbate those attributes*. As noted in the introduction to this section, the concept of risk burden or risk load, in which multiple risk factors interact with and exacerbate one another, is important for understanding the development and maintenance of problem behavior over time.

Three other studies have provided information about developmental variation after the preschool years by focusing on middle childhood and early adolescence. One investigation of Swedish adoptees found that personality patterns at age 11 predicted alcohol abuse and dependence at age 27 (Cloninger et al. 1988). These results are similar to the New Zealand findings in that two quite different types of temperament noted in childhood—behavioral undercontrol and behavioral inhibition—led to problems with alcohol. Swedish boys who were high in novelty seeking and low in harm avoidance (dimensions akin to behavioral undercontrol), as well as boys high in

harm avoidance and low in novelty seeking (akin to overcontrol, fearfulness, and inhibition), were more likely to have alcohol problems at age 27.

In a second study (Masse and Tremblay 1997), teacher's ratings of certain traits of children at ages 6 and 10 were predictive of the onset of drunkenness during the age range of 11 to 15 years. The ratings used by the teachers involved "fearfulness" and "hyperactivity"; however, the authors interpreted these ratings as measuring the same behaviors rated in the Swedish study. They equated fearfulness with the Swedish measure of harm avoidance, and they equated low fearfulness and hyperactivity with the Swedish measure of novelty seeking. Teacher's ratings indicating hyperactivity and low levels of fearfulness at ages 6 and 10 were significant predictors of drunkenness between ages 11 and 15. Among 6-year-olds, the high fearfulness rating was a better predictor of later problems, and hyperactivity was a better predictor for the 10-year-olds.

A third study investigated long-term correlates of aggressive behavior in more than 600 subjects followed from age 8 to 30 (Eron et al. 1987). Results revealed that children who were rated as aggressive by their peers were more likely than other children to have records for driving while intoxicated some 22 years later. Taken altogether, these studies provide major evidence that features of temperament observed from early childhood are predictive of alcohol problems and alcoholism in adulthood.

Varying Developmental Trajectories Over the Life Span

Risk factors for problematic alcohol involvement such as those described above do not inevitably result in alcohol-related problems. Other influences that may foster problems or protect against them come into play as the individual develops (Sher and Gotham 1999; Zucker et al. 1996*a*). Moreover, one factor alone may not be sufficient to cause problems. Rather, multiple factors acting in concert increase the likelihood that alcohol problems will develop by increasing the risk load. Researchers explore these intricate patterns of influence and their gradual emergence by charting developmental trajectories to describe the various pathways that, over time, may lead to or away from an outcome.

Longitudinal projects like the New Zealand study point toward the existence of quite different developmental pathways that begin in early childhood and involve behavioral forerunners of alcohol use. Among the children studied, two very different traits, behavioral undercontrol and behavioral inhibition, were associated with development of alcohol abuse and dependence in early adulthood (Caspi et al. 1996). Because high-risk children began with two different behavioral traits and moved to a common endpoint, some other influences, either in the intervening time period or in baseline characteristics of the two groups, or both, had to be operating (Patterson et al. 1998).

Developmental trajectories can be used to describe the big picture from early childhood through adulthood or to clarify details of a smaller part of the picture. Recent work based on nationally representative longitudinal data from the Monitoring the Future Study has focused on developmental processes using biennial assessments (Schulenberg et al. 1996*a,b*). This research charted pathways of alcohol involvement for the interval between late adolescence and early adulthood, examining patterns of stability and change in frequent binge drinking between ages 18 and 24. This age group spans the important developmental period of transition from adolescence to adulthood. It is also the life stage with the heaviest concentration of alcohol problems. Frequent binge drinking was defined as taking five or more drinks in a row on at least two occasions during the past 2 weeks. Patterns of binge drinking were explored in terms of behaviors, attitudes, personality traits, and characteristics of the social context that either shifted or remained stable along with the drinking.

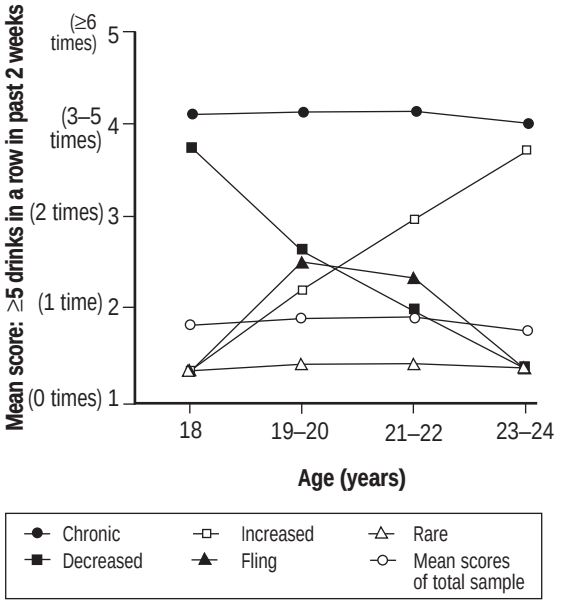
The researchers found that six distinct trajectories described the binge drinking of over 90 percent of

the sample (figure 3) (Schulenberg et al. 1996*a*). Three patterns were stable—Never, Rare, and Chronic—and three patterns varied across time—Decreased, Increased, and Fling (the Fling group had no frequent binge drinking at the first and last measurement points and frequent binge drinking at the midpoints). People with different binge trajectories showed differences in the problems alcohol caused them, in their attitudes about heavy drinking, in the amount of time they spent with heavily drinking peers, and in the extent of their involvement with illicit drugs. Gender differences were also evident. Women dominated the Never group, but appeared less frequently than men in the Chronic and Increased groups. Personality also played a role (Schulenberg et al. 1996*b*). People who had lower scores at age 18 on both conventionality and belief in one's own effectiveness in accomplishing an objective (self-efficacy), as well as those who said they drank to get drunk, were more likely to be in the Increased binge drinking group. On the other hand, higher self-efficacy and lower motivation to get drunk were protective factors among initially frequent binge drinkers who decreased their drinking.

These findings demonstrate considerable variation in pathways to drinking patterns once regular drinking has begun and reflect developmental differences in the success with which adolescents make the transition to adulthood. A very important approach for future studies, from both a theoretical and a prevention perspective, will be to identify, before people begin regular drinking, the characteristics associated with specific trajectories that they would later follow. The studies reviewed in the previous section indicate that this process of identification is already possible for a subset of the population. This knowledge base needs to be expanded.

An implicit acknowledgment that developmental pathways exist can also be seen in work attempting to classify different subtypes of alcoholism, a body of work with a long history (Cloninger 1987; McCord 1988; Zucker 1994, 1987; Zucker et al. 1996*a*). Investigators who have focused on differences in family history of alcoholism, parental criminality, alcohol use, and other

Figure 3: Mean scores for five or more drinks in a row in the past 2 weeks by binge drinking trajectory



Source: Schulenberg et al. 1996*a*. Reprinted with permission from *Journal of Alcohol Studies*, Vol. 57, pp. 289–304, 1996. Copyright 1996, Alcohol Research Documentation, Inc., Rutgers Center of Alcohol Studies, Piscataway, NJ.

psychopathology, as well as timing of initial symptom onset, all have worked under the assumption that different trajectories of alcohol problems and dependence follow from these background characteristics. Research has focused on identifying alcoholic subtypes in which people with common characteristics develop similar alcoholism patterns. For example, typologies classify alcoholism according to age of onset, family history of alcoholism, and presence or absence of antisocial behavior (Babor et al. 1992; Hesselbrock et al. 1984; McGue et al. 1997; Zucker et al. 1995*a*). Studies investigating childhood personality predictors of adult alcohol use disorder represent efforts to describe early developmental trajectories (see Chassin et al. 1999; Cloninger et al. 1988; Martin and Sher 1994; Vaillant 1995; Wong et al. 1999; Zucker and Gomberg 1986; Zucker et al. 1996*a,b*).

Relatively little is known about developmental pathways that bring about change in a person's diagnosis of alcoholism over the adult life course. However, research has shown that the progression of alcoholism is not uniform for all individuals, whether or not they are treated. That is, not all alcoholics remain actively alcoholic after the onset

of the disorder. A general population study investigated stability and change in measures of alcohol abuse and dependence over 4 years among male drinkers (Hasin et al. 1990). Of those originally classified as alcohol dependent, 46 percent still reported indicators of dependence 4 years later, 15 percent had moved to the abuse only category, and 39 percent no longer reported any indicators of alcohol abuse or dependence. Of those originally classified as alcohol abusers, 24 percent remained in the abuse only category, 30 percent reported indicators of alcohol dependence with or without indicators of abuse, and 46 percent no longer reported any indicators of alcohol abuse or dependence. Similarly, a recent review summarizing eight long-term studies found that individuals originally classified as alcohol dependent became abstinent at a rate of about 2 percent per year (Vaillant 1995).

Whether remission is spontaneous or results from treatment efforts, little is known about developmental pathways leading to changes in drinking status over time. As noted in the *Ninth Special Report to the U.S. Congress on Alcohol and Health* (National Institute on Alcohol Abuse and Alcoholism [NIAAA] 1997), factors contributing to successful recovery during treatment have been identified, including increased self-efficacy, fewer coexisting psychiatric problems, a supportive social network, experience with the negative consequences of drinking, and readiness to change. Developmental research on earlier phases of drinking careers suggests that risk factors do not act independently of each other but rather cluster together (Babor and Dolinsky 1988; Donovan and Jessor 1985; McGee and Newcomb 1992; Murphy and O'Farrell 1994, 1996). Conversely, the degree to which context and personality factors interact in contributing to remission is not well understood.

The epidemiologic evidence clearly indicates that problem use drops off with increasing age and with the restriction of consumption that comes with the increased responsibilities of marriage, a regular job, and other adult responsibilities (Bachman et al. 1997; Gotham et al. 1997). Conversely, the presence of the "problem behavior syndrome" predicts continuity of heavier drinking into young adulthood (Baer et al. 1995; Bennett et al. 1999). Other research suggests that "protective" factors (for example, the absence of problem behaviors such as criminal activity) predict a successful return to nonproblematic drinking for alcohol-abusing and alcohol-dependent individuals (Sobell et al. 1993; Tucker et al. 1994), but the degree to which protective factors cluster together is not clear. Unfortunately, the range of opportunity for problem drinkers to benefit from protective factors is often restricted by their drinking behavior and its consequences, including having poorer jobs and lower income, living in a more disadvantaged neighborhood, and choosing to marry a more troubled partner (Jacob and Bremer 1986; Kandel et al. 1986; Zucker et al. 1996*b*, in press). Thus, any contact with a more supportive environment may initially take place piecemeal.

A more complete understanding of how these factors operate, either separately or in concert, is critical to understanding stability and change in alcohol dependence over time. In addition, the role played by environmental risk factors in fostering individual stability or change at other points in the life cycle after adolescence needs to be addressed. The contribution of factors, such as chronic health, marital stresses, spousal and other peer approval of drinking, and factors related to the settings in which drinking occurs need to be better understood (Brennan and Moos 1996; Sher and Gotham 1999). It is important to note that what patients and clinicians regard as "recovery" is called that only because a formal diagnosis has been made. From a developmental perspective, the more general phenomenon that needs to be understood is the natural history of use and problem use over time, which involves both increases (clinically termed "relapse") and decreases (clinically called "recovery").

Social Contexts and Drinking Behavior

Variability in Drinking Behavior Among Societies and Subcultures

In the effort to document the damaging effects of alcohol use, abuse, and dependence at the individual level, overarching social factors that

also influence use and problem drinking behavior are sometimes ignored. One of the factors consistently identified in the epidemiologic literature is that the overall level of consumption in a society (that is, its relative "wetness" or "dryness") is related to the rate of alcohol problems (Edwards 1994; Hilton 1988; Skog 1985). In cultures and historical epochs where consumption is high, rates of alcoholism are higher, and in cultures or epochs where consumption is lower, alcoholism rates are lower (Reich et al. 1988). At the same time, research has shown that among drinkers in drier regions, there is a higher rate of alcohol-related problems, such as accidents, problems with spouses and friends, and difficulties with the police (Hilton 1988).

These data underscore the principle that both drinking and problem drinking are regulated by social structures (rules, role expectations, norms, and values) and by the social behavior of the drinker's peers (Clark 1991; Greenfield and Room 1997; Hilton 1988). Because of the importance of these factors, developmental scientists have worked to understand the role that social context and group membership play in maintaining or changing developmental pathways (Bronfenbrenner 1979; Ford and Lerner 1992).

Demographic Variables as Proxy Indicators for Social Behavior

Racial/ethnic group membership and membership in an age group are identifying characteristics of individuals, but they are simultaneously indicators of the differences in attitudes, values, beliefs, and practices of social subgroups. As discussed above, memberships in and of themselves do not explain how alcohol use and more problematic drinking patterns come about. Aside from providing an identity, the label of group membership is also a proxy for differences in the way the group acts, how available it makes alcohol and other drugs, its regulatory structure for alcohol and other drug use, and other social behaviors. This underlying social structure defines and shapes the relationship between group membership and alcohol involvement (Heath 1988). One of the core aims of developmental research has been to identify the common underlying factors that place some groups and social contexts at higher risk than others and then to develop prevention and intervention strategies to eliminate or neutralize their effects.

When the research question is framed this way, it highlights an interesting observation, namely, that many of these markers are cooccurring and therefore are potentially related indicators of a more basic set of influences. For example, both low overall rates of alcohol use and high rates of problem drinking among current drinkers have been observed among people with a lower educational level, rural residence, and Southern location (Dawson et al. 1995). These characteristics also happen to be markers of a subculture with strong abstinence values, which influence both the individual drinking patterns and the overall level of alcohol consumption of the society (Edwards 1994; Hilton 1988; Skog 1985).

The more general point is that variations in demographic characteristics indicate differences in lifestyle that relate to norms about alcohol use and misuse (Greenfield and Room 1997), including the valuing of alcohol as a sought-after beverage (Laflin et al. 1994) and the accompanying presence of a social network that provides pressure to use or not to use, or to engage in more or less problematic drinking behavior when using (Oostveen et al. 1996).

Demographic Factors as Life Course Identifiers

Age-related variations in alcohol use exist for virtually all indicators of alcohol involvement. In addition, at least among men, differences between racial/ethnic groups are more the rule than the exception. Indeed, cross-sectional data from a number of surveys show that within racial/ethnic groups, levels of both alcohol consumption and alcohol abuse vary significantly with gender (Caetano and Clark 1998; Caetano and Kaskutas 1995; Gerstein et al. 1994; Grant 1997; Grant et al. 1992). From a life course perspective, these variations suggest that people in different racial/ethnic and gender groups should be looked at in terms of their different life cycle tasks and patterns of alcohol use.

With respect to gender differences alone, more than a decade ago, a longitudinal study showed that problematic drinking patterns emerge later in life for women than men (Fillmore 1987). In addition, for women, less time elapses from the initial emergence of the problem to full-blown problem development. In other words, the shapes of their trajectories differ from those of men. However, more recent data, discussed later in this section, suggest that this gap is closing (Grant 1997).

With respect to racial/ethnic distinctions alone, analyses of shifts in national drinking patterns between 1984 and 1992 indicate that decreases in heavy drinking observed among whites were not present among either blacks or Hispanics (Caetano and Clark 1998; Caetano and Kaskutas 1995). Thus, these subpopulations are operating differently with regard to patterns of alcohol abuse.

Variation across ages according to race/ethnicity and gender is illustrated in figures 1 and 2, which show the percentage of subgroups in the U.S. population that reported having four or more drinks on any single day during the prior 30 days. These data derive from the Substance Abuse and Mental Health Services Administration National Household Survey (Gerstein et al. 1994; Jackson et al. 1998). At all ages, females in each racial/ethnic group exhibited lower levels than comparable males. Within each gender, however, racial/ethnic groups displayed different age-related patterns. These age-related racial/ethnic patterns were most marked in males. Among white men, the proportion of heavy drinkers peaked between ages 18 and 25 and then declined with increasing age. In Hispanic men, the peak occurred between ages 26 and 30, and the age-related decline was less marked than in whites. In black men, the peak also occurred between ages 26 and 30, but the proportion was consistently lower at each age in blacks than in Hispanic men.

Researchers in the last decade have been attempting to look beneath these surface demographic data and develop theories about the common social forces that regulate variations in drinking behavior among these racial/ethnic and gender subgroups. Using a life course framework, some researchers have focused on racial/ethnic subgroup variations. For example, differences between blacks and whites in the age trajectory of alcohol use and problems (see figures 1 and 2) have been related to a combination of factors, including urban migration, declining heath status of middle-aged black Americans, less access of blacks to the opportunities among blacks of the larger society, and the cumulative effects of adverse living conditions and restricted socio-economic opportunities among blacks (Geronimus 1992; Jackson et al. 1998).

A related idea is that culture-specific social forces might affect alcohol problem rates reported by black and white women. Research suggests that black women experience more tolerant attitudes toward their drinking than white women do and that blacks historically demonstrate greater equality in gender roles than whites do (Herd 1997). These factors may influence the amount of negative reaction to heavy drinking encountered by black and white women, and may thereby indirectly affect their self-ratings of alcohol dependence (Herd 1997). Similarly, one researcher has proposed that both trajectory effects and life course-related role differences between older and younger members of the Hispanic community account for the stability of heavy drinking among elder Hispanic men (Caetano 1991). The social networks of these drinkers tend to insulate them from outside pressures to change; because of their status, older men are less likely to be challenged by younger members of the community. Thus, patterns of heavy drinking that the elder men established at an earlier life stage are not as likely to become disrupted.

Finally, although differences clearly exist in drinking patterns from one culture to another, cross-cultural similarities have also been observed. Evidence for both the differences and similarities can be derived from a review and synthesis of data from more than 20 international longitudinal surveys of drinking behavior (Fillmore et al. 1991; Johnstone et al. 1996). National origin of the research, an indicator of the culture of each sample, was the most influential factor in

predicting drinking patterning. Evidence supports the view that within a given culture, each gender develops a pattern of alcohol consumption in youth and early adulthood and the pattern is largely set for a person's lifetime. The evidence also points to a "maturational hypothesis" that can be seen in all cultures. This cross-cultural pattern involves rapid rises in drinking behavior in early adulthood followed by declines in frequency of use with increasing age (Johnstone et al. 1996).

Changes in Patterns of Drinking Behavior as a Function of Social Change

Cohort and Subgroup Differences

As noted, it is a common epidemiologic observation that the problems of alcohol involvement are most heavily the problems of youth. This observation is as true for the United States as it is for the rest of the world (Dawson et al. 1995). Here also, as part of the normal life cycle, alcohol consumption and problem use decline with advancing age (Adams et al. 1990; Bachman et al. 1997; Blane 1979). However, changes in individual drinking behavior over time are not solely a function of age-graded life cycle changes. As discussed above, individuals' different developmental pathways, such as those related to temperament, are superimposed on life stage changes, as are influences of the larger society (Zucker et al. 1995*a*). Thus, if the society's patterns of use and attitudes about use change, one can anticipate that such a change will either suppress or enhance the emergence of individual drinking behavior.

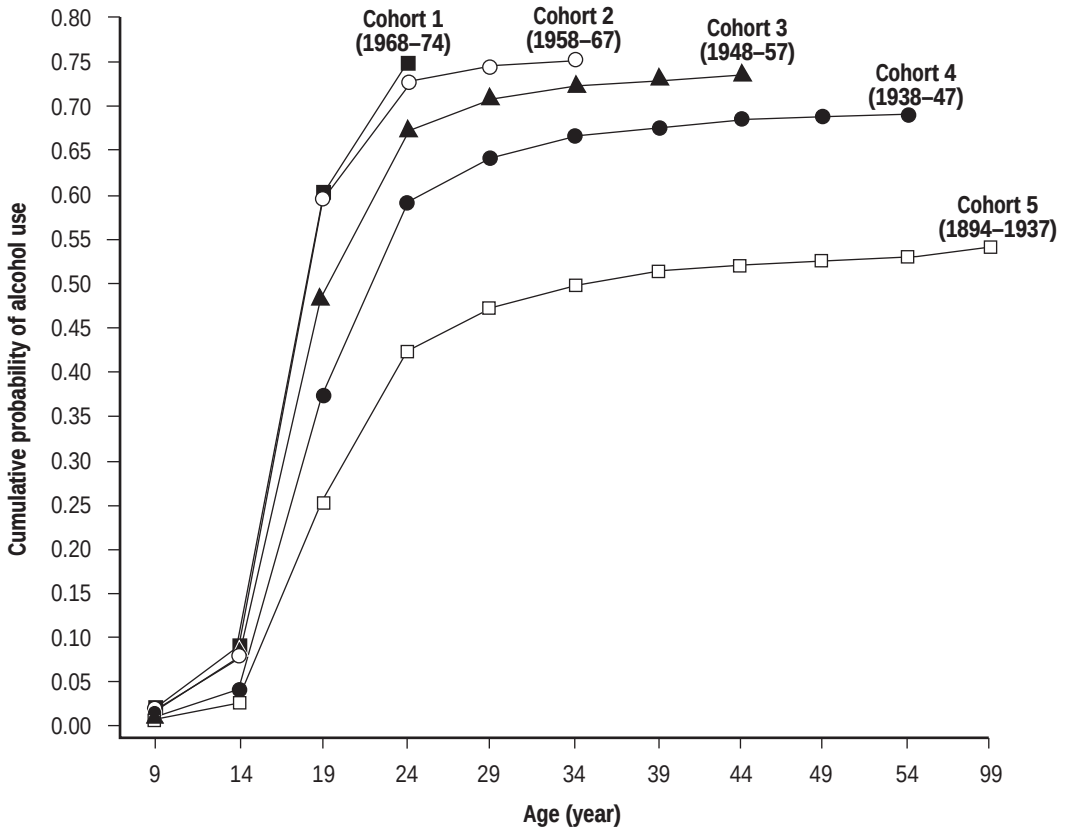
Recent analyses from the first wave of the National Longitudinal Alcohol Epidemiologic Study (NLAES) (Grant 1997) suggest that considerable social change in drinking has occurred over the past century. This change has been characterized by increasingly earlier ages for the onset of alcohol use (figure 4) and increased likelihood of alcohol dependence among cohorts of drinkers (figure 5). For example, a shift was observed in the probability of alcohol use in early adulthood (ages 20 through 24). In the group born before World War II (between 1894 and 1937), drinking was confined to less than half of the young adult population. However, in the group born in the Vietnam era (between 1968 and 1974), alcohol use involved approximately three-fourths of young adults. Both genders displayed this trend, although levels among females were consistently lower than levels among males. A major upward shift was also observed in the likelihood that a drinker would be diagnosed with alcohol dependence at some point in his or her lifetime. Although these findings are quite consistent, caution should be used in their interpretation, since the data were derived using methods in which individuals were surveyed at a single point in time. In addition, participants were asked to remember the age at which various alcohol-related problems became manifest. Thus, methodological problems, such as recall difficulties, especially for events from the distant past and for relatively transitory events (as well as cohort-specific differences in willingness to reveal alcohol problems), may have affected the results.

Cohorts

Cohorts are groups of persons born during a given time span (such as Baby Boomers) who experience a common set of historical, social, and economic influences that tend to shape the behavior of group members in similar ways. Central to the concept of a cohort is the idea that those who share a culture acquire a body of common experiences, and in so doing create a unique subculture, with shared norms and values and commonalities in behavioral repertoire.

Gender-specific data indicate the appearance of another major social change: increasing similarity of drinking patterns of men and women (Grant 1997). For persons in early adulthood (ages 20 through 24), males born before World War II were 2.4 times as likely as females to use alcohol. The ratio is much smaller for those born in the Vietnam era: males were only 1.2 times as likely as females to use alcohol. For lifetime diagnosis of alcohol dependence, findings are equally striking: males born before World War II were 4.9 times as likely as females to receive such a

Figure 4: Cumulative probability of alcohol use, by cohort



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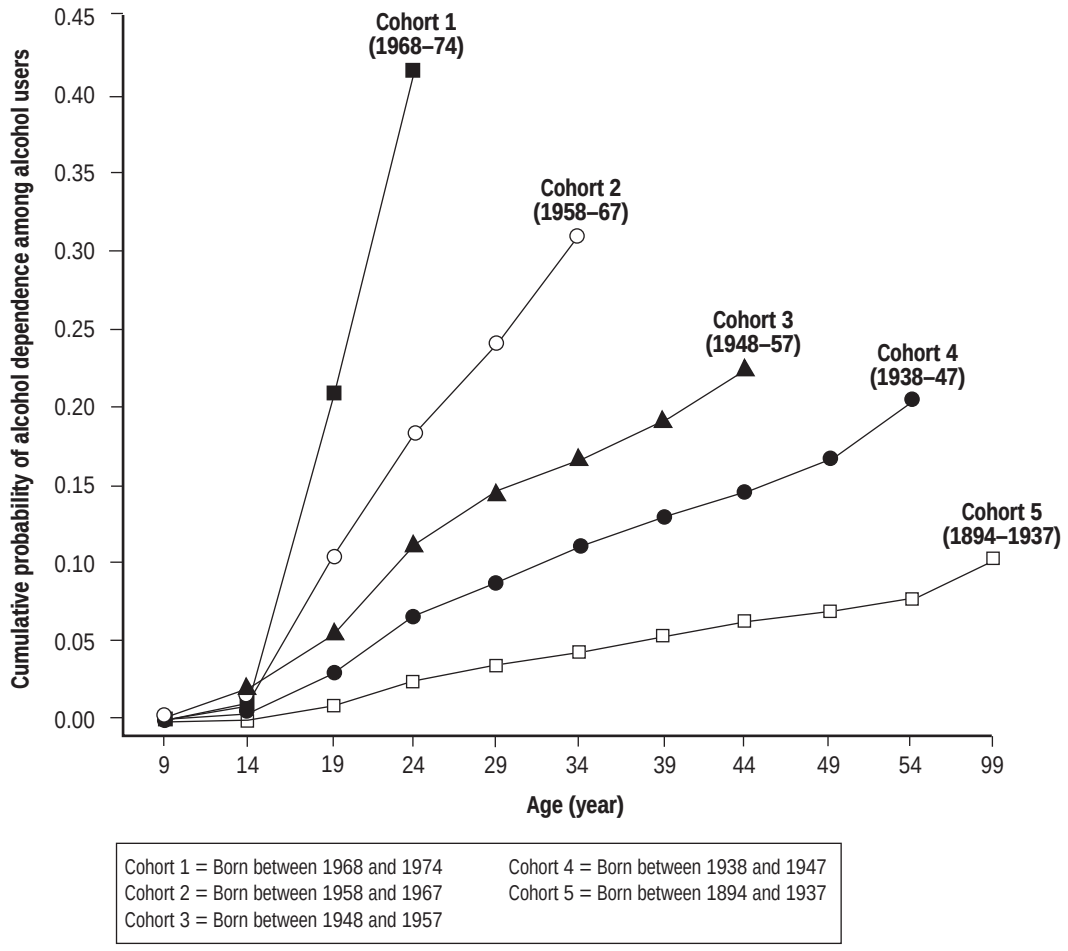
diagnosis, but for those born in the Vietnam era, the male-to-female ratio was only 1.4. A similar pattern of converging rates of alcohol dependence in men and women has also been noted in the National Comorbidity Study (Nelson et al. 1998).

NLAES data highlight yet another phenomenon of developmental interest: diagnostic stability into later life (Grant 1997). Men were more likely to sustain a diagnosis of alcohol dependence over time than were women, and this persistence was most evident in the youngest cohort (that is, those born between 1968 and 1974), the group that also showed the earliest onset of both alcohol use and dependence. These findings also lend support to a long-held view in the field of alcohol and other drug abuse that differences in the timing of onset of use can change the structure and trajectory of the disorder (Robins and Pryzbeck 1985). Stronger support comes from recent data (Grant and Dawson 1998) indicating that the younger the age of drinking onset, the greater the likelihood that an individual will develop an alcohol use disorder at some point in life.

From a developmental-contextual perspective (Ford and Lerner 1992), the individuals in each cohort have been moving through the life course surrounded by a different social structure of attitudes and expectancies about alcohol use and other social behavior and about alcohol dependence. On these grounds, the effects of the social change on individual drinking behavior

Figure 5: Cumulative probability of alcohol dependence among alcohol users, by cohort



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should vary according to the individual's stage in life, or "life course location" at the time the change is occurring. This proposition has been labeled the "life stage principle" (Elder and Caspi 1989). It specifies that the influence of a historical event on the life course depends on the stage at which an individual experiences the event. The effects of social change and individual response to such change will vary in type and relative influence across the life course (Elder and Caspi 1989). The analytic usefulness of the life stage principle in alcohol research lies in its potential to help the field organize and understand the significant changes in patterns of use and dependence that occur at both the younger and the older ends of the age spectrum.

Variations in Alcohol Use Among the Elderly

Patterns of drinking among those over age 60 provide another illustration of the interaction of a person's location in the life course, the subgroup to which he or she belongs, and the level of alcohol involvement. The elderly population is an important and interesting subgroup because it is rapidly increasing in size, as it has throughout U.S. history, and its composition is changing (Day 1996; Hobbs and Damon 1996). Between 2010 and 2030—when the Baby Boom cohort moves into the ranks of the elderly—this population will swell to more than 55 million people (some estimates range as high as 75 million), from about 33 million in 1994. The

proportion of the population over age 65 will increase by 73 percent during this 20-year interval, while the segment under age 18 will decrease by 3 percent. Whereas about one in eight Americans were over age 65 in 1994, by 2030 that figure will be one in five (Day 1996; Hobbs and Damon 1996). These data suggest that in the coming years the Nation will become more focused on the processes and outcomes of aging, and that the needs of older citizens will become an even more central concern (Zucker 1998).

Along with demographic and social changes, patterns of alcohol consumption among the elderly are also changing. Sales data for alcoholic beverages and results from a national survey show a significant decline in the 1980's in the level of alcohol use in the U.S. population as a whole (Midanik and Clark 1994). Results from 1984 and 1990 national surveys on alcohol use show that 70 percent of the population reported current drinking in 1984, but only 65 percent did so in 1990. (Current drinking was defined as consuming alcohol at least one time in the year preceding the survey.) However, these overall population figures obscure significant variation in certain subgroups, especially age and gender groups. For example, 59 percent of men aged 60 and older were current drinkers in 1984, but the figure increased to 66 percent in 1990 (Midanik and Clark 1994). For women aged 60 and older, the trend was reversed: 49 percent were current drinkers in 1984, and 37 percent in 1990. Thus, elderly men displayed a larger increase and elderly women exhibited a larger decline in current drinking than the overall population did.

This age-by-gender variation, on the one hand moving in opposition to overall population trends and on the other hand consistent with them, underscores another developmental principle that has special relevance for the elderly, namely, that there is very large subgroup heterogeneity (Hertzman et al. 1994; Ruchlin 1997). Thus, although population statistics indicate that drinking generally declines as people age, this decline does not translate to low levels of drinking and low levels of problems for all elderly individuals. For example, when the elderly population is examined in terms of racial/ethnic group membership (see figures 1 and 2), the heterogeneity of drinking patterns is clear. The relatively greater use of alcohol and the higher prevalence of alcohol dependence in the Baby Boomer cohort compared with the previous cohort (Grant 1997) are also important factors, particularly because this group will be the next generation of elderly Americans.

In general, drinking among the elderly produces problems not seen in younger groups because of changes in health and social support that often accompany aging. Thus, for older individuals, even relatively modest alcohol use may cause significant problems because of chronic illnesses, the interactions of alcohol with medications, grief brought on by the death of loved ones, and isolation due to the loss of social support networks (Dufour et al. 1992; Gomberg et al. 1998).

In addition to increased numbers of older individuals in the population, other changes can be expected to produce substantially greater problem use among the elderly than in past generations (Zucker 1998). One change will be the substantial increase in the total number of white Americans in the elderly population (Hobbs and Damon 1996). In absolute numbers, the subpopulation of Caucasian older Americans will increase by 45 percent, which may have ramifications for the future because white males who drink have historically continued to use alcohol into older age (Caetano and Kaskutas 1995; Substance Abuse and Mental Health Services Administration 1997). In addition, this subpopulation, which will remain the largest subgroup of the elderly population over the next two decades (Hobbs and Damon 1996), will have a higher educational level and greater financial resources than earlier generations, resulting in a lifestyle of sustained leisure-time activity in which moderate alcohol use is the norm. As noted above, even moderate use can create significant problems as people age.

Another change likely to lead to increased problem alcohol use in the elderly will be the growth of the Hispanic population, which is expected to show the largest rate of increase of any racial/ethnic elderly subgroup over the coming decades (Hobbs and Damon 1996). Results from a 1992 survey show that Hispanic males have the highest incidence of frequent heavy drinking among all racial/ethnic groups (Caetano and Kaskutas 1995). In addition, when 1992 results were compared with 1984 findings, the heavy-drinking patterns of Hispanic men were more likely than those of white men to remain stable over time (Caetano and Kaskutas 1995). Yet another change that will likely increase problem drinking is the projected doubling of the number of elderly persons from socio-economically disadvantaged groups. These groups already have higher rates of drinking problems and appear to be sustaining a higher level of problem use into older age than existed in earlier cohorts of the elderly (Caetano and Kaskutas 1995).

Finally, the elderly population will experience increased longevity—the oldest-old population (those aged 85 and older) is expected to double to 7 million persons by 2020 (Hobbs and Damon 1996). As older people live longer, complications from interactions of alcohol with medications and medical disorders are likely to increase sharply. Little is currently known about the relationship between patterns of alcohol use, especially higher levels of drinking, and the physical and health conditions unique to persons in this group (NIAAA 1997), or about differing medical consequences of alcohol intake within different age groups of the elderly population (Smith and Baltes 1997). What is known, however, foreshadows difficulties as changes occur in the makeup of the elderly population. Alcohol-related hospitalizations among the elderly are common, with rates similar to those for heart attack (Adams et al. 1993). Injuries and deaths in alcohol-related accidents are a serious problem among the elderly: 11 percent of drivers aged 65 through 74 in fatal crashes in 1994 tested positive for alcohol (National Highway Traffic Safety Administration 1995). In addition, in nonfatal crashes, the extent of injury sustained by an older person is likely to be greater than that sustained by a younger person for a crash of equal force (Waller 1998).

Development and Drinking Behavior: Dynamic Models of Stability and Change

The usefulness of the developmental perspective is shown by its recent emergence as a tool for understanding the development of risk for a variety of health behaviors and chronic diseases (for example, see Blane 1995; Kuh and Ben-Schlomo 1997; Mann et al. 1992). A recent extensive review of the relationship between socioeconomic status and health outcomes noted that the course of adult health and disease risk is influenced by multiple sets of life course factors (Kuh et al. 1997). One set involves exposure to long-term biological chains of risk, another involves exposure to social chains of risk. Both chains continue to operate throughout the life course via learning experiences (a third chain) that lead to adult outcomes, which in turn affect disease risk through behavioral style and through heightened exposure to causal factors later in life.

In the same manner, a multilevel set of factors produces life course variation in alcohol use and alcohol dependence. Patterns of use are regulated by cognitive and motivational networks, which are determined by the user's subjective experience of the drug, knowledge of the rule structure for appropriate use, and belief about whether it is more or less desirable to drink at a given point in time (Fischhoff and Quadrel 1995). The immediate encouragement and availability offered by peers also regulate onset and course. The timing of when initial use takes place and the development of problem use are heavily influenced by patterns of alcohol use among peers. Peers whose behavior involves risk taking and antisocial behavior are also more likely to encourage early problem drinking, and their continued presence increases the likelihood that drinking problems will emerge and be sustained.

At the same time, alcohol-related disorders are brain disorders, involving the brain's mechanisms

for appetite, craving, reward (Koob et al. 1994), planning and forethought, affective states such as depression and anxiety, and behavioral control. Relative sensitivity to alcohol's effects (Schuckit 1994) and the ability to control drinking (Pihl and Bruce 1995; Pihl and Peterson 1991) also play a role.

Developmental theory reminds us that the two domains of influence—one psychosocial, the other neurobiological—operate within the confines of a larger, less visible system that surrounds its members. Nonetheless, the rule, availability, and activity structure of the larger society plays a highly significant role in regulating drinking behavior. This larger social system restrains heavy consumption in some eras and in some community settings and allows it to flourish in others. Legal restriction and social policy affect the use of alcohol. Prohibition and wartime rationing are examples of a phenomenon that continues to change as lawmakers and policy makers restrict or increase the availability of alcohol and change the penalty structure for its use. Finally, societal context and neurobiology interact from the time of an individual's conception. Thus, the individual becomes a dynamic organism functioning in a social, psychological, and biological context (Gottlieb 1991; Nesse and Berridge 1997; Wiers et al. 1998). This multilevel explanatory structure is the causal puzzle that scientists are currently working to piece together. The developmental framework allows the pieces to begin to be fit together.

In Closing

A complex set of factors introduces individuals to alcohol and produces variations in alcohol use and abuse over the life course. Factors include psychosocial and neurobiological mechanisms as well as influences from the larger society. A mounting body of evidence has begun to demonstrate that this process is a dynamic one, involving the creation of a chain of risk with contributions to outcome from three sets of factors—neurobiologically determined and regulated life course processes not specifically related to alcohol; other life course processes, such as disadvantaged socioeconomic status, also not specifically related to alcohol; and factors pertaining to alcohol, such as group norms about use. A series of recent studies shows that measures of behavioral undercontrol in early childhood are predictive of adult alcohol disorder. Although this work is only one part of the complex developmental puzzle of how early risk leads to clinical disorder, it indicates that the process is one involving neurobiological vulnerability, psychosocial factors that support the vulnerability, and a culture that makes alcohol available for use. Solving this developmental puzzle will require multidisciplinary efforts to formulate models of causal processes at different mechanistic levels and at multiple stages in the life course of risk and clinical disorder.

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